

## Ecology: The Biotic and Abiotic Environment

**7-4 The student will demonstrate an understanding of how organisms interact with and respond to the biotic and abiotic components of their environments. (Earth Science, Life Science)**

**7-4.6 Classify resources as renewable or nonrenewable and explain the implications of their depletion and the importance of conservation.**

**Taxonomy level:** 2.5 and 2.7-B Understand Conceptual Knowledge

**Previous/Future knowledge:** Students in the elementary grades studied various Earth materials that have useful purposes. In 5<sup>th</sup> grade (5-3.6), students explained how human activity such as conservation efforts and pollution has affected the land and the oceans of Earth. The concept of resources being renewable or nonrenewable is new content for this grade.

**It is essential for students to** know that all organisms on Earth, including humans, use resources provided by the environment. Earth supplies a variety of *natural resources* that living things use, change, and reuse. Some resources can be replaced and reused by nature; these are *renewable* resources. Natural resources that cannot be replaced by nature are *nonrenewable*.

Renewable resources are replaced through natural processes at a rate that is equal to or greater than the rate at which they are being used. Air, freshwater, soil, living things, and sunlight are renewable resources.

- Air can be cleaned and purified by plants during the process of photosynthesis as they remove carbon dioxide from the air and replace it with oxygen.
- The water cycle allows Earth's water to be used over and over within the environment.
- Topsoil is formed to replace soil that has been carried away by wind and water (although new soil forms very slowly).
- Trees and other new plants grow to replace those that have been cut down or died.
- Animals are born to replace animals that have died.
- Sunlight, or solar energy, is considered a renewable resource because it will continue to be available for billions of years. It provides a source of energy for all processes on Earth.

Nonrenewable resources are exhaustible because they are being extracted and used at a much faster rate than the rate at which they were formed.

- Fossil fuels (coal, oil, natural gas), diamonds, metals, and other minerals are nonrenewable.
- They exist in a fixed amount and can only be replaced by processes that take millions of years.

Natural resources can be depleted or used to the point that they are no longer available.

Conservation measures are necessary for nonrenewable resources because they are known to be in a non-replenishing supply. If renewable resources are used at an increasing rate so that they cannot be naturally replaced fast enough, they too can be depleted.

- Soil that is lost because it is left bare of vegetation and allowed to erode depletes the land of the fertile topsoil needed for plant growth in that area.
- Depletion of freshwater in an area caused by increased demand by the population living there, by wasteful use of the water, or by pollution, can result in water not being available in needed quantities or being unfit for natural use.

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- Depletion of a living resource, such as trees being removed without being replanted, can contribute to environmental changes in the land, air, and water in that area.

As the number of people on Earth gets larger, the need for natural resources increases. The terms reduce, reuse, recycle and protect are important ways that people can be involved in conservation of natural resources.

- *Reducing* involves making a decision to not use a resource when there is an alternative, such as walking or riding a bicycle rather than traveling in a car.
- *Reusing* involves finding a way to use a resource (or product from a resource) again without changing it or reprocessing it, such as washing a drinking glass rather than throwing away plastic or Styrofoam.
- *Recycling* involves reprocessing a resource (or product from a resource) so that the materials can be used again as another item, such as metals, glass or plastics being remade into new metal or glass products or into fibers.
- *Protecting* involves preventing the loss of a resource, usually living things, by managing their environment to increase the chances of survival, such as providing wildlife preserves for endangered animals.

**It is not essential for students to** know how human consumption of natural resources affect the physical and chemical cycles and processes of Earth, as this is a topic that will be further developed in high school biology.

### Assessment Guidelines:

The objective of this indicator is to *classify* natural resources as renewable and nonrenewable; therefore, the primary focus of assessment should be to determine a category based on the description of the natural resource. However, appropriate assessments should also require students to *exemplify* natural resources that are either renewable or nonrenewable; or *summarize* ways that natural resources are renewed.

Another objective of this indicator is to *explain* implications of depleting or conserving natural resources; therefore, the primary focus of assessment should be to construct a cause-and-effect model of depletion and conservation of resources. However, appropriate assessments should also require students to *summarize* major points about Earth resources and the importance of conservation; *infer* effects of the depletion of a resource; or *recall* ways that conservation can be accomplished.